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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
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ART UNIT	**PAPER NUMBER**
1763	

DATE MAILED: 03/09/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/821,753	NI ET AL.	
	Examiner	Art Unit	
	Luz L. Alejandro	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 December 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6,10-13,17,18,20-23,25,26,28,30-33 and 38-44* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6, 10-13, 17-18, 20-23, 25-26, 28, 30-33, 38-44* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

Claim 40 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 40 fails to further limit claim 41 because claim 40 discloses the power remaining constant for no more than one second and claim 41 discloses the power remaining constant for 1 millisecond.

Claims 38-41 objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. None of the claims depends (directly or indirectly) from any of the independent claims. Note that claim 40 was amended to depend on claim 41, however, claim 41 depends on claim 40. Additionally, note that claims 38-39 also depend on claim 41.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-6, 8-13, 17-18, 20-23, 25-26, 28, 30-33, 38-39, 40-41, and 43-44 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written

description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The specification, as originally filed, does not provide support for "the AC etchant plasma always being the dominant material applied to the workpiece while the feature is being formed" as claimed in claim 1-lines 3-5 and claim 17-lines 8-10. Furthermore, it appears that using a deposition gas with the etching gas is taught in paragraph 0030 of the instant application.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 38-41 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The dependency of the claims is not clear since none of the claims depends (directly or indirectly) from any of the independent claims. Note that claim 40 was amended to depend on claim 41, however, claim 41 depends on claim 40. Additionally, note that claims 38-39 also depend on claim 41.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-6, 8-13, 17-18, 20-23, 25-26, 28, 30-33, and 38-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bhardwaj et al., U.S. Patent 6,051,503 in view of Howald et al., WO 00/58992.

Bhardwaj et al. shows the process substantially as claimed including a method of etching a workpiece in a vacuum plasma processor chamber comprising converting a gas species into an AC etchant plasma that is either the dominant material or the only material that is continuously applied to the workpiece while a feature of the workpiece (for example, a portion of the sidewall of the trench) is being formed, the vacuum

chamber being subject to operating at different pressures while the workpiece is being processed (see abstract), the gas species being subject to flowing into the chamber at different flow rates while the workpiece is being processed (also see abstract), gradually changing, the amount of AC power supplied to the plasma during etching of the workpiece (see col. 6-lines 43-47 and abstract), wherein a gradual transition in the shape of material in the workpiece being processed occurs in response to the gradual power change, the gradual power change occurring during the gradual transition in the shape of the material (see abstract, col. 6-lines 43-49, col. 8-line 57 to col. 9-line 26, and figs. 19A-19B). Note that inherently a gradual power change will also produce a rounded profile in Bhardwaj et al. since the gradual power change in the instant application similiarly produces a rounded profile.

Bhardwaj et al. fails to expressly disclose: wherein the gradual change is pre-programmed, and wherein the electrode is responsive to an AC power source that is supplied by a coil coupling an RF plasma excitation field to the chamber. Howald et al. discloses a method of processing by etching (see page 1-lines 15-19) a workpiece in a vacuum plasma processor chamber including computers 20 and 34 and wherein a gas species is converted into an AC plasma (see page 6-lines 17-20). Note also that the AC power is supplied by an electrode 56 being on a holder for the workpiece and the electrode is responsive to an AC power source that is supplied by a coil 48 coupling an RF plasma excitation field to the chamber. In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Bhardwaj et al. so as to include a process using the apparatus of Howald

et al. because such an apparatus allows for a high level of control over the plasma process being performed. Moreover, with respect to the changes in power being pre-programmed, it would have been obvious to one of ordinary skill in the art at the time the invention was made to pre-program the power change into the microprocessors 20,34 of Howald et al. because in such a way operator error will be eliminated. Moreover, merely using a computer to automate a known process does not by itself impart nonobviousness to the invention. See Dann v. Johnston, 425 U.S. 219, 227-30, 189 USPQ 257, 261 (1976); In re Venner, 262 F.2d 91, 95, 120 USPQ 193, 194 (CCPA 1958).

With respect to claims 2 and 18, note that the process can be conducted while no change is made in the species, the pressure, or the flow rate since the abstract of Bhardwaj et al. states only one or more of the parameters need to be changed.

Concerning claims 8-11 and 21-22, note that in Bhardwaj et al. the species is ionized into a plasma that etches the material to form the feature, the gradual power change (see abstract and col. 6-lines 43-49), the species, and the continuous application of the plasma to the workpiece being such that the material is shaped to have a rounded corner that includes the formed feature, which includes a trench wall having a lower rounded corner, in response to changes in the plasma etchant resulting from the gradual power change (note that by gradually changing the power the corner of the trench will be rounded similarly as in the instant application).

With respect to claims 12-13, 26, 28, 30-31, and 40-41 concerning the specific time period to which the power remains at constant wattage and the amount the power

is changed, it would have been obvious to one of ordinary skill in the art at the time the invention was made to determine through routine experimentation the optimum amount of time at which the power should remain constant and the optimum amount the power is changed, to achieve the desired rounded profile of the trench and such limitations would not lend patentability to the instant application absent a showing of unexpected results.

Double Patenting

Applicant is advised that should claim 43 be found allowable, claim 44 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Allowable Subject Matter

Claim 42 is allowed.

Response to Arguments

Applicant's arguments filed 12/27/05 have been fully considered but they are not persuasive. Applicant argues that in Bhardwaj et al. etchant is not always the dominant material applied to the workpiece during formation of a feature nor is it the only material

applied to the workpiece. However, as discussed above, there is no support under 35 USC 112, first paragraph, in the originally filed specification for such a limitation. Furthermore, even if there were support, the rejection would still be proper because, for example, when giving the claims their broadest reasonable interpretation a "feature" could be a small portion of the trench that is formed, and therefore the claims as currently amended would still read on the references.

Concerning the rejection under 35 USC 103 over Bhardwaj et al. in view of Howald et al., the examiner respectfully submits that the examiner's interpretation of the word "feature" is proper since such an interpretation gives the claim its broadest reasonable interpretation. Furthermore, such an interpretation is also appropriate with respect to dependent claims 10-11 and 20-22 and rejections with respect to these claims are also maintained.

With respect to the fact that a rounded profile will not be created in Bhardwaj et al. similar to the instant invention because the power is held constant for a longer time, while it is possible that the same rounded profile will not be formed in Bhardwaj et al. than in the instant invention, it is clear that in both the application and the reference a rounded profile will be formed.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luz L. Alejandro whose telephone number is 571-272-1430. The examiner can normally be reached on Monday to Thursday from 7:30 to 6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Luz L. Alejandro
Primary Examiner
Art Unit 1763

March 6, 2006